UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

SR-6J

April 10, 2013

Ms. Dorothy Alke
Vice President, Environmental Projects
CBS Corporation
20 Stanwix Street
Pittsburgh, PA 15222

Ms. Elaine Hammick
Director of Environmental Engineering and Sustainability
ABB Inc.
5 Waterside Crossing
Windsor, CT 06095

RE: Report of Results of Trend Analysis of Eight Quarters of Sampling at Detmer Spring 2011-2012 and Recommendations for Further Sampling

Dear Ms. Alke and Ms. Hammick:

The United States Environmental Protection Agency (EPA) has completed the review of the Report of Results and Trend Analysis of Eight Quarters of Sampling at Detmer Spring 2011-2012 and Recommendations for Further Sampling, dated February 20, 2013. Pursuant to the April 26, 2012 ABB Final Long Term Groundwater Monitoring Plan, Detmer Spring has been monitored for eight consecutive quarters, beginning in March 2011, with the most recent sampling event completed in December 2012. The reviewed documents provide a summary of these data and contain recommendations for future monitoring.

Background

The January 3, 2008 ABB Administrative Order on Consent (AOC) requires groundwater monitoring for polychlorinated biphenyls (PCB) and select volatile organic compounds (VOC) and contains the provision that: *"The monitoring plan will be reevaluated after five years to determine if the monitoring program will be continued, modified or eliminated."* CBS proposed in a draft groundwater monitoring plan to sample Detmer Spring, the primary karst groundwater resurgence point for the site, for eight consecutive quarters and to perform Mann-Kendall (M-K) non-parametric statistical trend analysis in order to make a decision about the frequency of future monitoring.

EPA commented on the draft plan that five years (20 quarters) of groundwater sampling would be required before a decision was made to continue, modify, or eliminate the monitoring plan. CBS then proposed that *at least* eight quarters of data would be collected in a response to comments dated July 7, 2011. However, the April 26, 2012 final version of the plan proposed

that only eight quarters of data would be collected and that these data would form the basis of the M-K statistical determination.

The statistical analysis is used to determine whether concentrations are increasing, decreasing, or there was no trend. According to Section 6.1.2 of the April 26, 2012 plan, based on M-K test results: *"...a decision will be made about the frequency and duration of any remaining monitoring."* No "if-then" statements regarding continuing groundwater monitoring were associated with the trend analysis testing and no significance level for the test was contained in the plan.

PCB Monitoring Data

All quarterly monitoring results since July 2008 for PCBs at Detmer Spring have been below 0.3 microgram per liter (µg/L), the level associated with cessation of monitoring at other Bloomington sites. Field duplicates of all samples were collected.

VOC Monitoring Data

VOCs were also detected in Detmer Spring water. The primary VOCs detected are trichloroethene (TCE) and tetrachloroethene (PCE). The highest values detected in the eight quarters of monitoring since March 2011, are respectively, 12 and 13 µg/L. These values are less than the comparative August 22, 2003 U.S. EPA Region 5 Surface Water Ecological Screening Levels (ESL) of 47 µg/L for TCE and 45 µg/L for PCE. The highest TCE result is lower than the corresponding National Recommended Water Quality (NRWQC) Human Health (HH) Criteria for consumption of organisms (30 µg/L), but the highest PCE value is higher than the NRWQC HH criteria of 3.3 µg/L.

Trend Test Results

Section 3.2 and Table 2 of the February 20, 2013 CBS report present the results of the M-K non-parametric trend tests. A decreasing PCB trend since March 2011 was reported for Detmer Spring PCBs. Neither the text nor the table indicates the significance level at which the test was conducted. The value of the M-K statistic (S) associated with the PCB test was -17 which would have an associated probability of exceedance of only 2.4%. Therefore, the test result would indicate a significant PCB decreasing trend at a 97.5% confidence level.

Table 1 of CBS's report tabulates the PCB data used in the M-K analysis. Each of the eight quarterly events consisted of a normal sample and a field duplicate sample. There were both detected and non-detected sample values. The M-K analysis was conducted using the average of the normal and duplicate sample values, but only if both samples were detectable values. For the case where either the normal or duplicate sample was non-detect, only the detect sample value was used in the analysis. If both samples were non-detect a value of 0 was utilized. Non-detect sample values were handled in an inconsistent manner.

A more consistent way to handle non-detect data is to utilize a value of one-half the detection limit for each non-detect value and to average all normal sample and duplicate sample values. Using this method, the sample values are shown in the last column of Table 1 below.

Table 1
PCB Values Used in M-K Test

Date	Table 1 Normal Value	Table 1 Duplicate Value	Value Used in M-K (Report)	Value Used in M-K (Figure 1)
3/28/11	<0.1	0.12	0.12	0.085
6/30/11	0.12	0.11	0.115	0.115
9/22/11	0.11	0.11	0.11	0.11
12/13/11	0.10	0.11	0.1	0.105
3/21/12	0.1	<0.1	0.1	0.075
6/20/12	<0.1	0.13	0.13	0.09
9/20/12	<0.1	<0.1	0	0.05
12/19/12	<0.1	<0.1	0	0.05

The PCB data were reanalyzed using the values in the last column of Table 1 using WQStat statistical evaluation software. The test results are shown in Figure 1. The test was performed at the 95% confidence level and provides an identical result (S value equals -17) to the value CBS presented in the report. The conclusion of both the CBS analysis and the analysis presented herein is that there is a 97.5% probability that the PCB concentration at Detmer Spring is decreasing based on the eight quarters of test data.

Figures 2 and 3 show the trend test analysis for TCE and PCE, the primary VOC compounds present at Detmer Spring. No data trend is present at the 90% confidence level, and this is in agreement with the CBS report text.

Although not done by CBS, previous groundwater monitoring data may be included in the trend analysis to provide a broader look at long-term concentration trends. Previous Detmer Spring data back to July 2008 were entered into the WQStat statistical database. Data plots for PCBs, TCE, and PCE are shown in Figures 4, 5, and 6, respectively. These data were again analyzed for a M-K trend. The analyses indicated significant decreasing trends for PCBs, TCE, and PCE at a 95% confidence level for the expanded 2008-2012 time frame (see Table 2 below). These data suggest that the ABB site remediation, conducted in mid-to-late 2009 has likely had a significant impact on reducing levels of these contaminants emergent at Detmer Spring.

Table 2
Mann-Kendall Trend Test Results

Time Period	Number Samples	PCBs	TCE	PCE
2011-2012	8	↓	□	□
2008-2012	14	↓	↓	↓

Notes:
□ No Trend (90% Confidence Level)
↓ Significant Downward Trend (95 % Confidence Level)

Continued Monitoring

The CBS trend analysis report recommends the sampling interval for Detmer Spring be reduced from quarterly to semi-annually until the next EPA five-year review. It is further proposed that: 1) if at that time, concentrations of all site-related contaminants are decreasing or stable, based

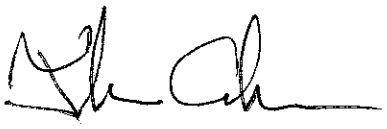
on the M-K trend analysis, and 2) do not exceed state or federal water quality standards, then sampling will be discontinued.

The ABB AOC stipulates that a review of the monitoring program be conducted as an element of the five-year review. The CBS proposal would likely provide for four additional semi-annual sampling events in 2013 and 2014, if the five-year review is completed late in 2014, or six additional semi-annual events in 2013, 2014, and 2015 if the five-year review is completed in 2015.

It is recommended herewith that quarterly sampling of Detmer Spring continue until the five-year review is conducted. Single test values could still strongly influence the trend test results due to the limited size of the current dataset. It is also important to continue monitoring at a more frequent basis because the property on which the spring is located is now a public park operated by the Monroe County Parks and Recreation Department.

It is also suggested that decisions on the cessation of monitoring be based on the presence of decreasing trends, and not merely the existence of "no trend" or the lack of an increasing trend. The 2008-2011 data should be included in the trend analysis and used in support of monitoring decisions, unless there are technical justifications presented by CBS as to why these data are not acceptable for use in the M-K analysis. The complete 2008-2012 dataset spans the period of the ABB site remediation and allows data trends associated with the 2009 site remediation to be more readily detected. The analysis should focus on the principal site contaminants (PCBs, TCE, and PCE) which have the highest frequency of detection and will therefore yield statistical results with the highest degree of confidence.

Sincerely,



Thomas Alcamo
Chemical Engineer

cc: J. Fliss, IDEM
J. Langley, CBU
D. Williamson, Monroe County

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Hollow symbols indicate censored values.

Sen's Slope Estimator

Detmer

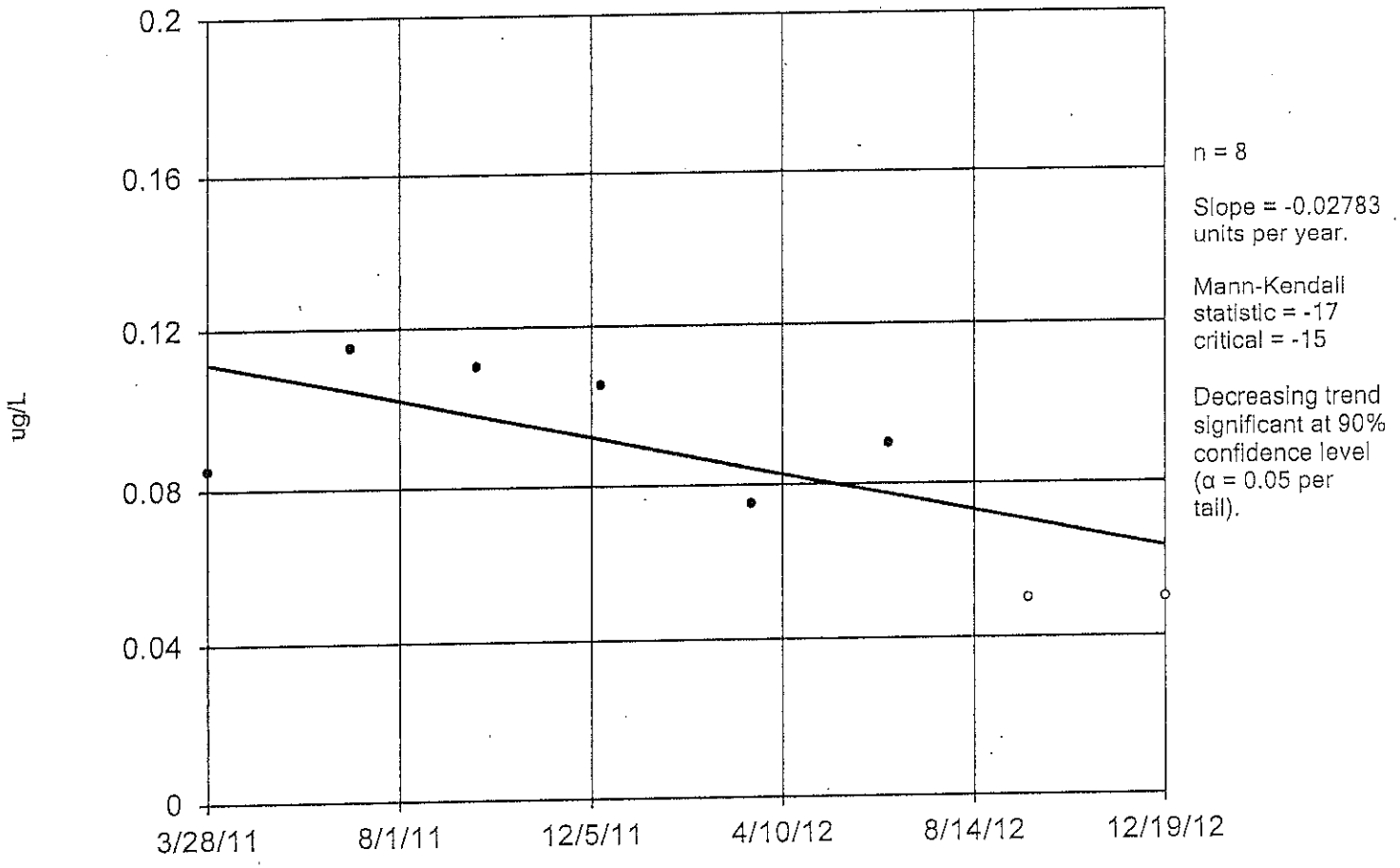

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Figure 1

Sen's Slope Estimator

Detmer

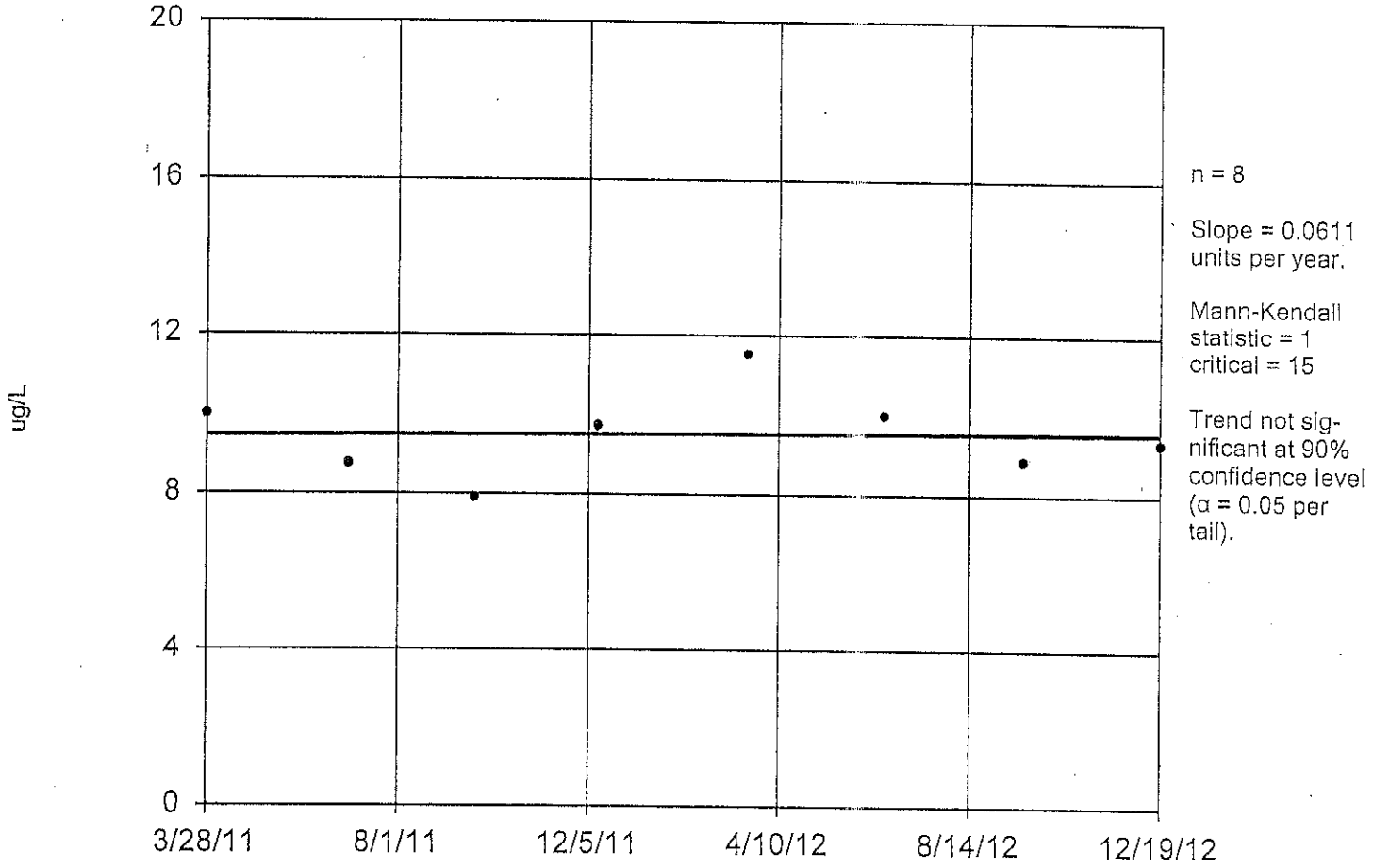

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Figure 2

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Sen's Slope Estimator

Detmer

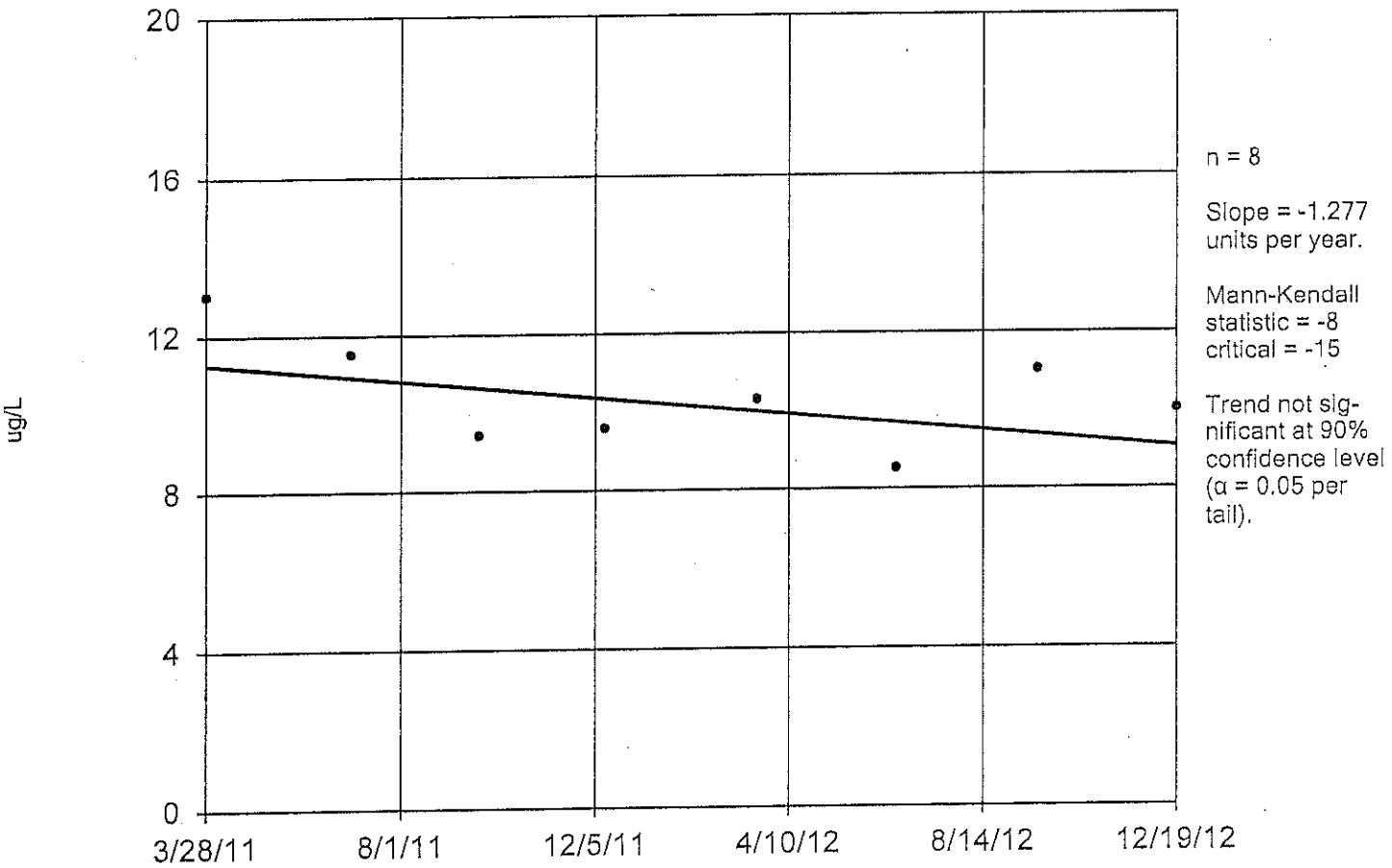

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Figure 3

Hollow symbols indicate censored values.

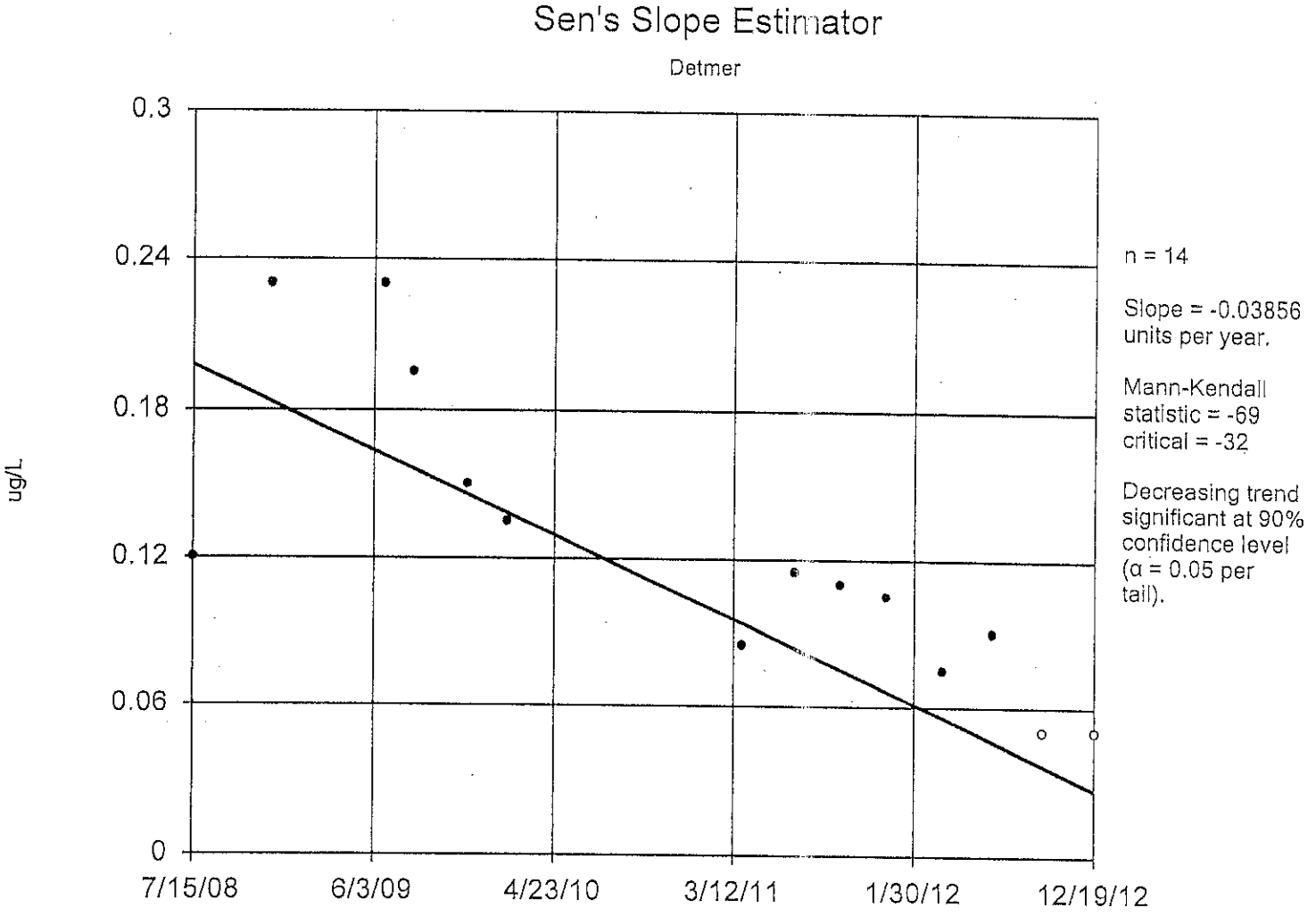

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Figure 4

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Sen's Slope Estimator

Detmer

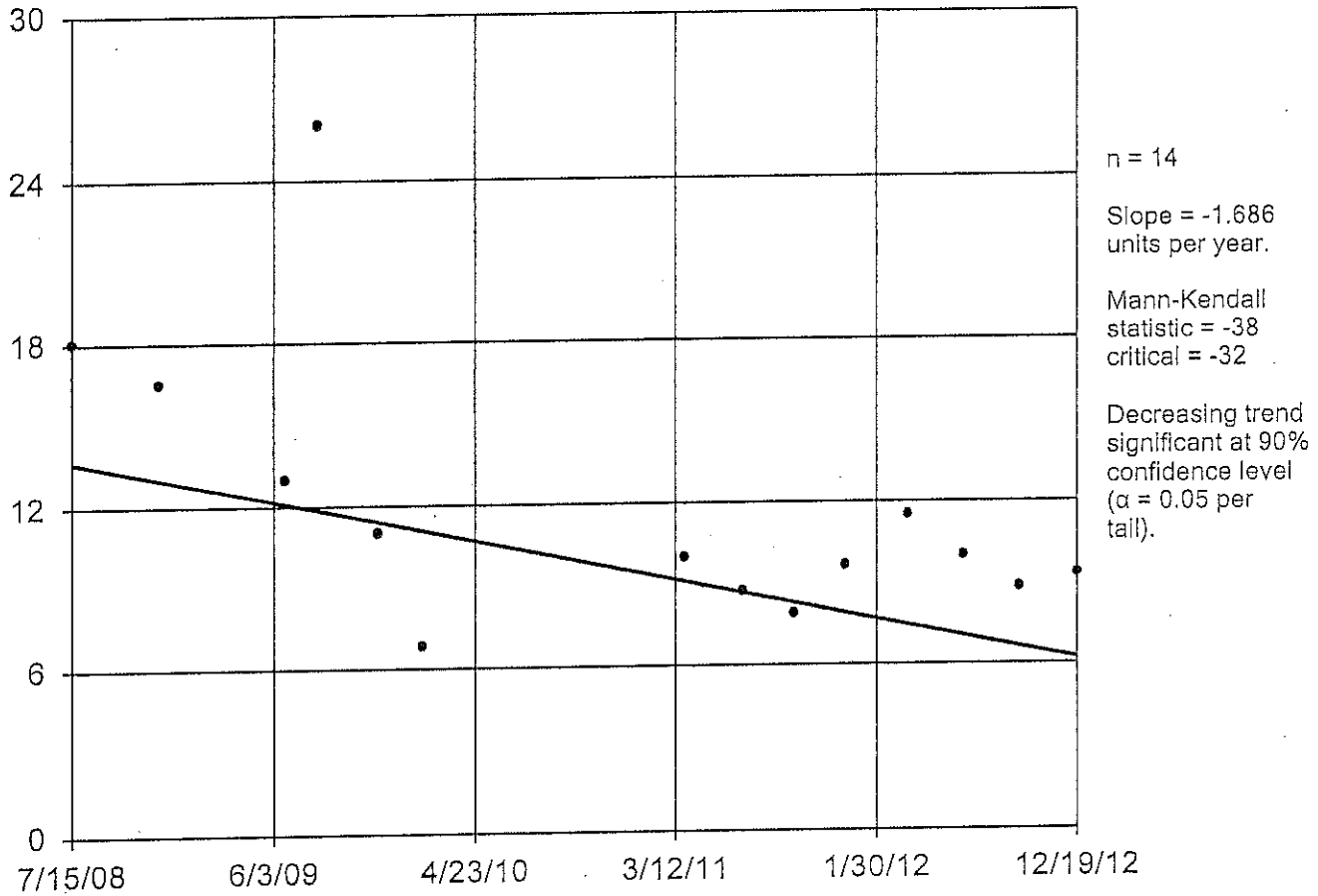

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Figure 5

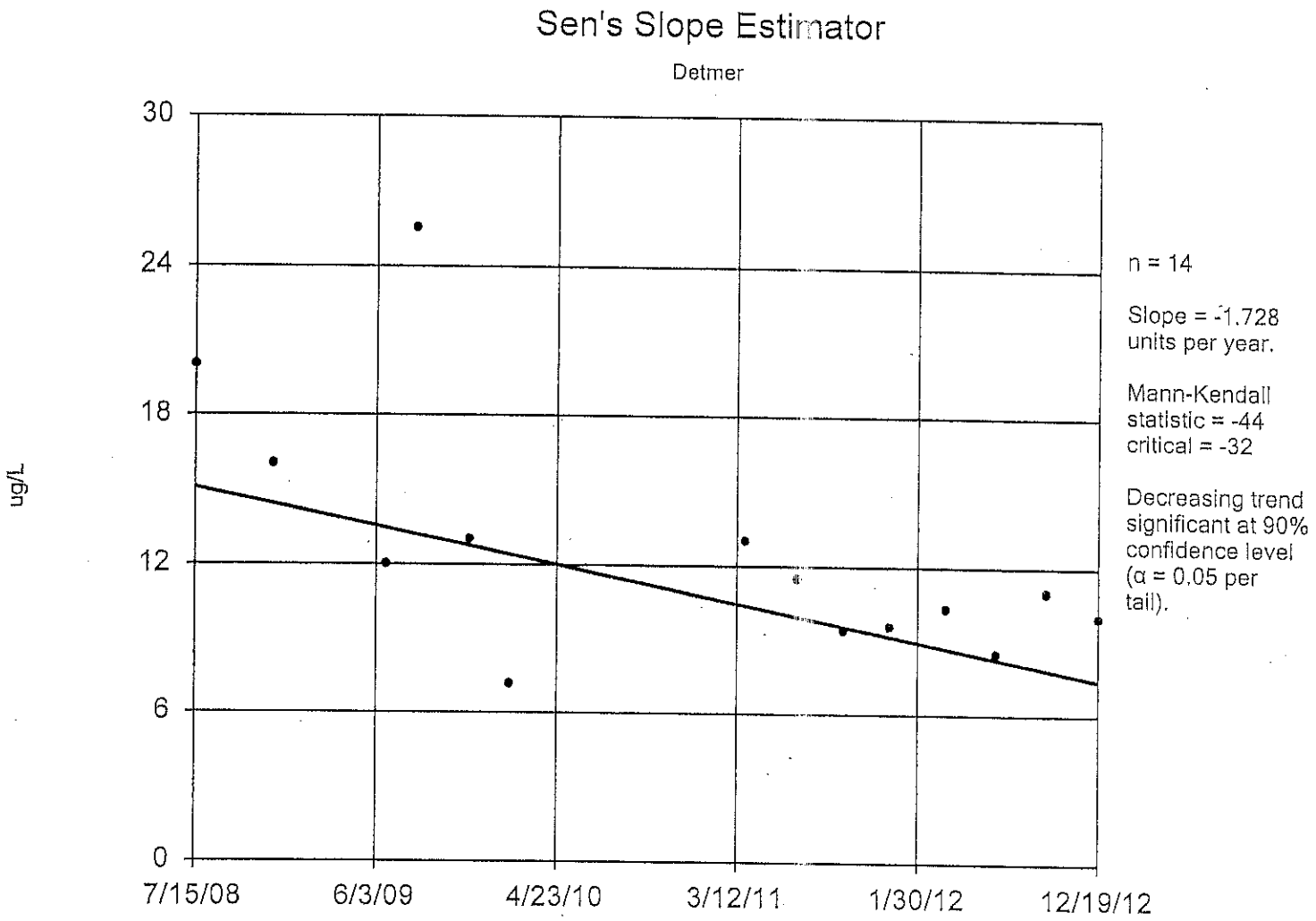

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Figure 6

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Sen's Slope Estimator

Detmer

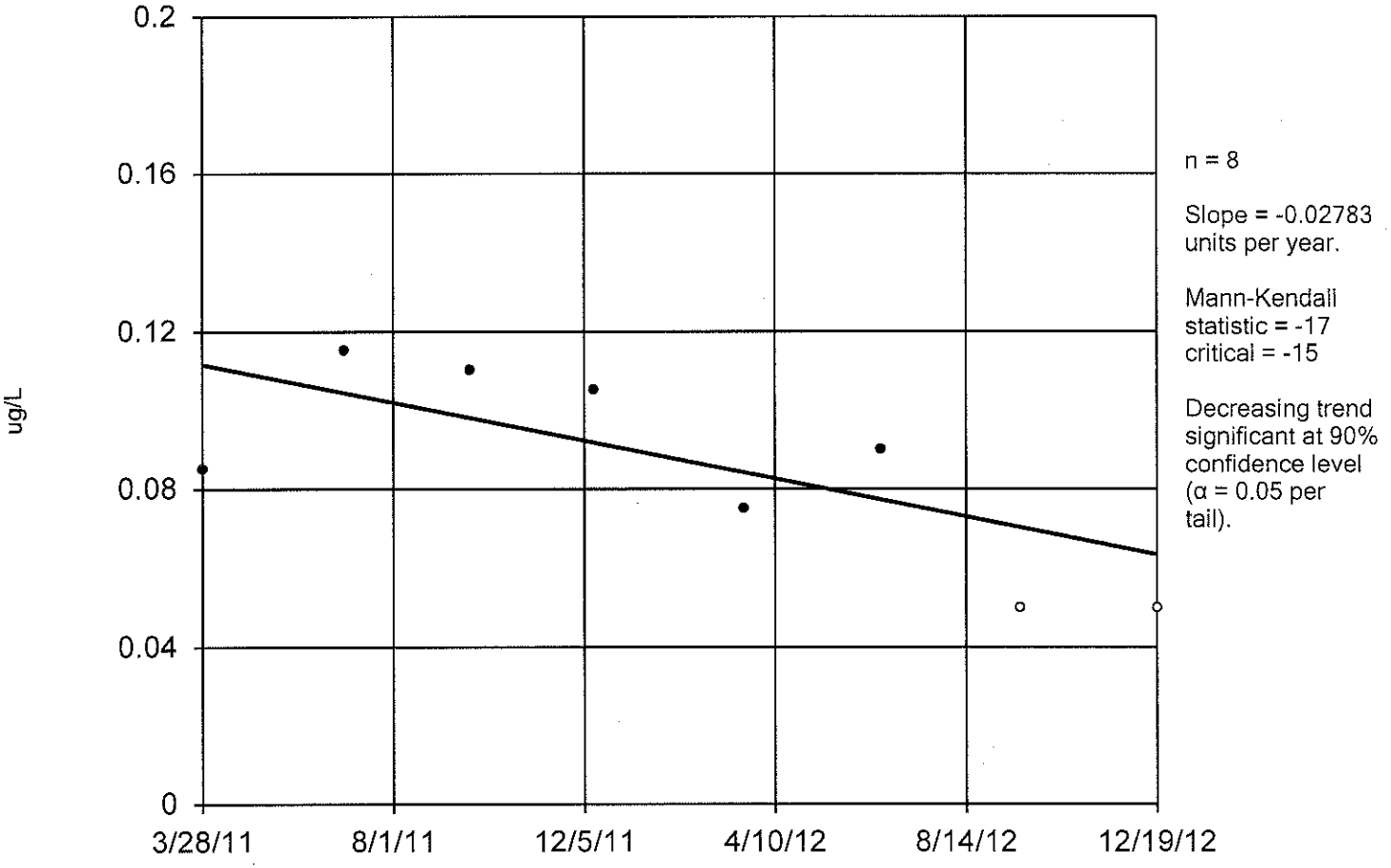

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Figure 1

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Sen's Slope Estimator

Detmer

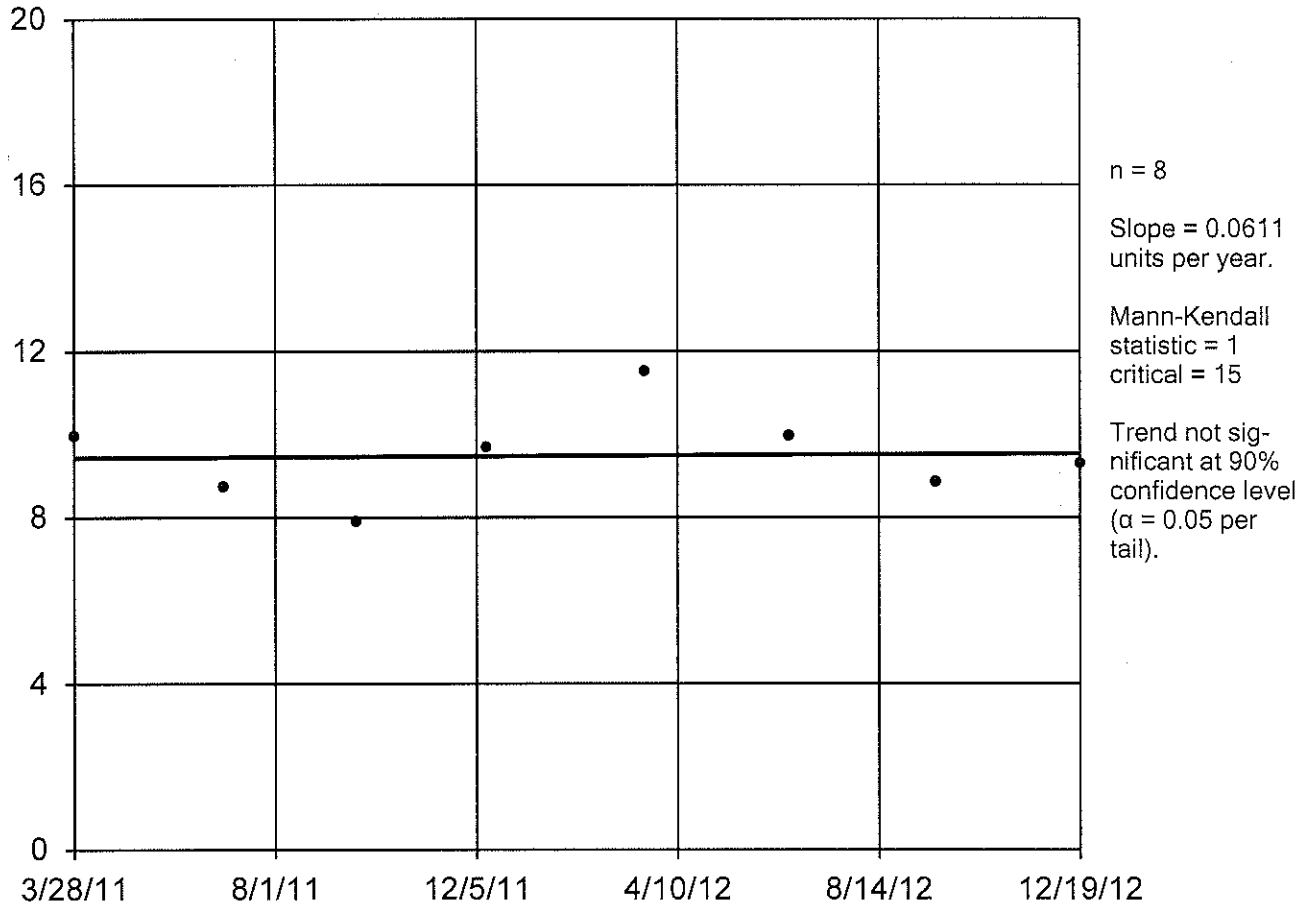

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Figure 2

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Sen's Slope Estimator

Detmer

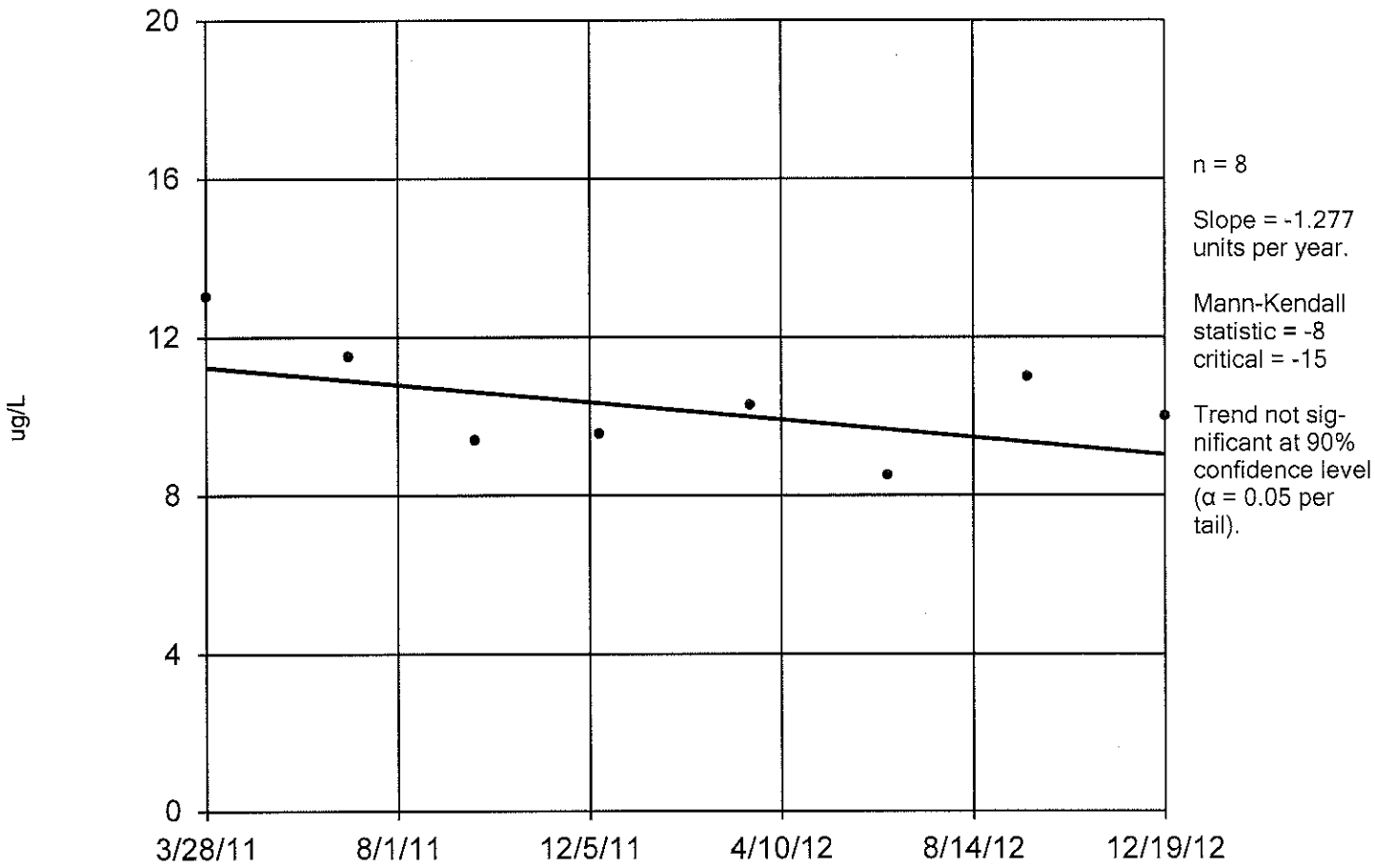

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Figure 3

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Sen's Slope Estimator

Detmer

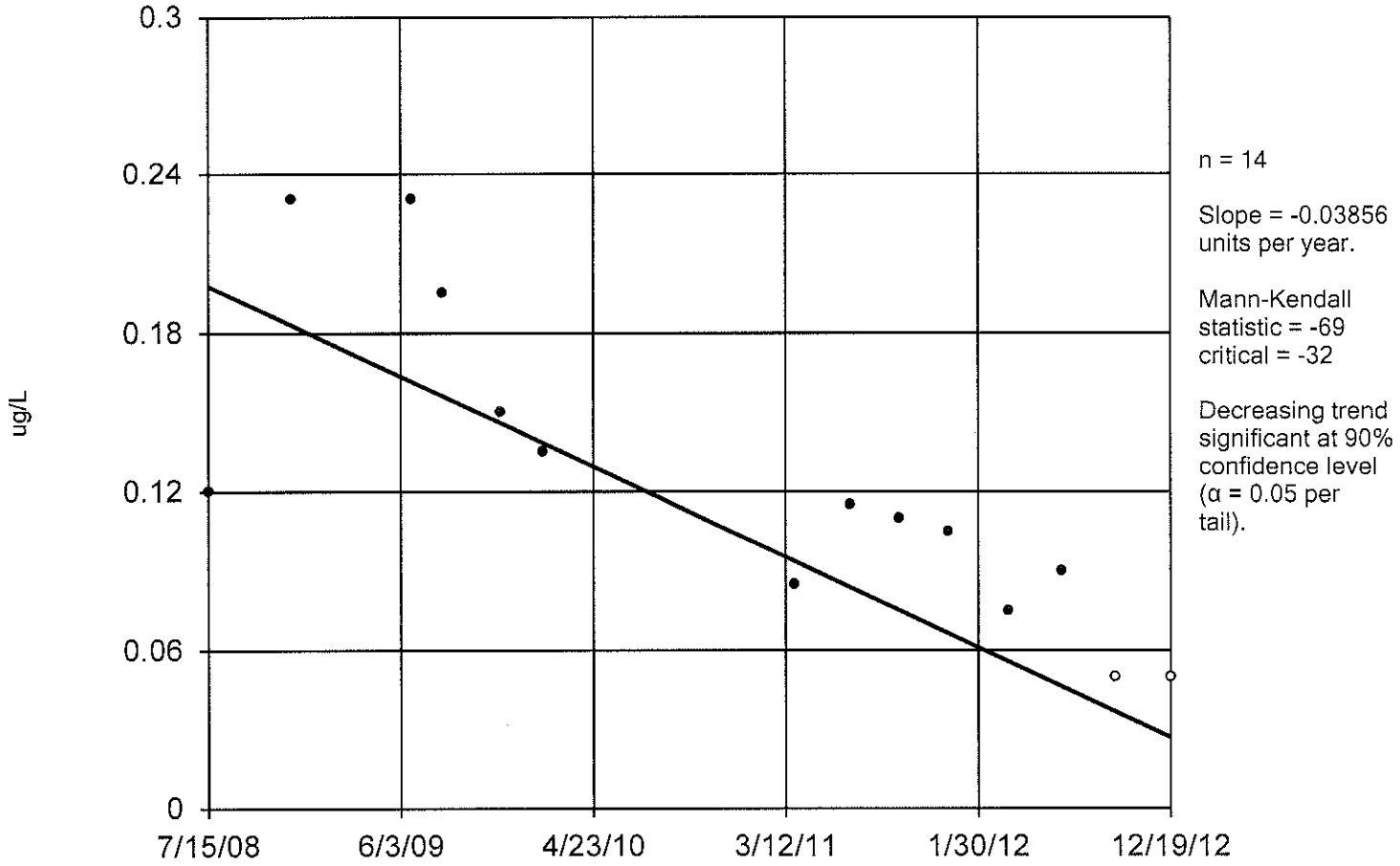

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Figure 4

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Sen's Slope Estimator

Detmer

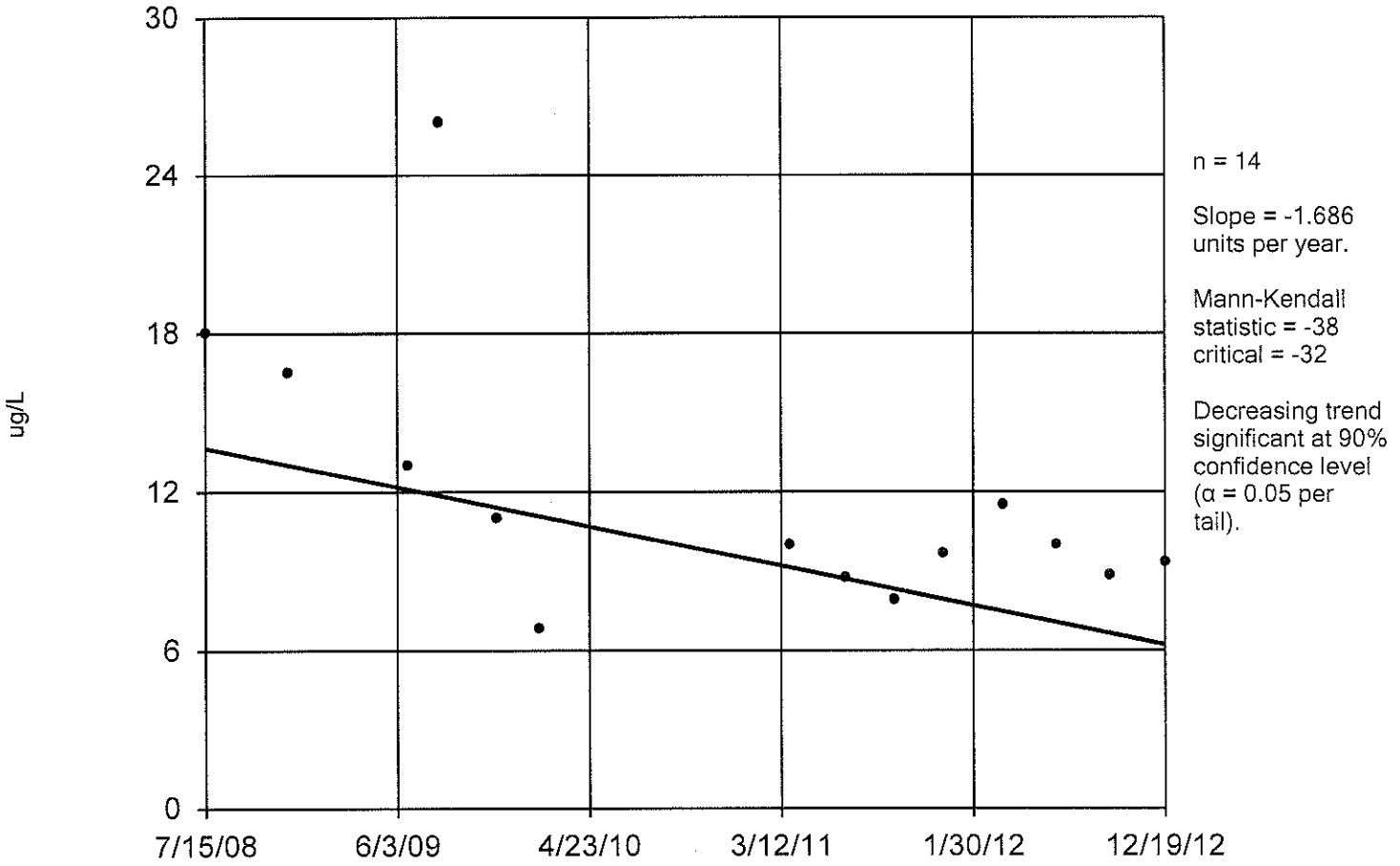

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Figure 5

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Sen's Slope Estimator

Detmer

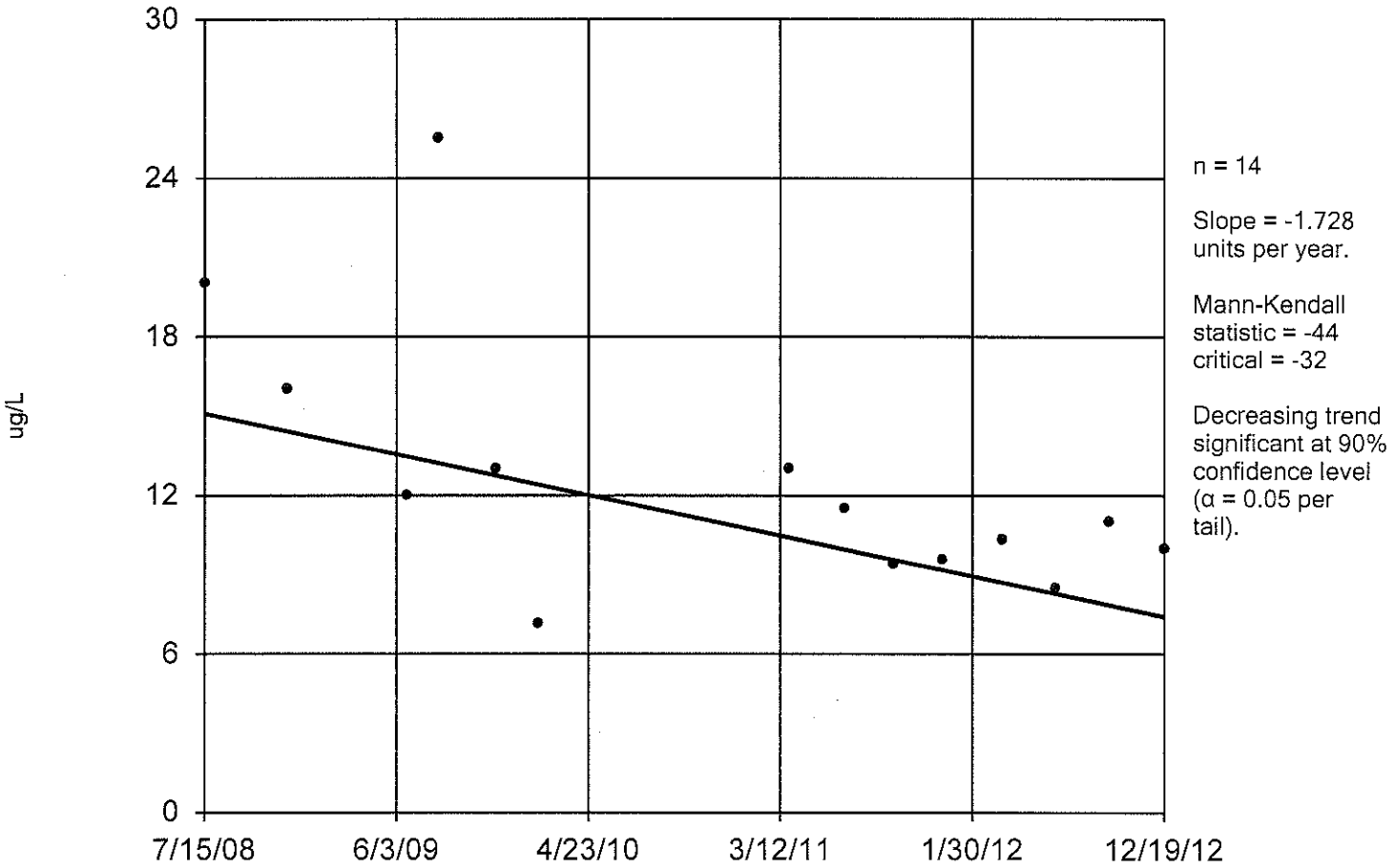

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Figure 6